

APPLICATION OF CHEMISTRY TO AGRICULTURE.

LECTURE BY BARON JUSTUS VON LIEBIG.

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In this manner science showed what was the real productive force of the soil, and fixed its laws of culture; it showed that the system of culture proposed by Thaer, would have had very different results if that eminent man had known the true productive force of the soil, and had been able to base upon it his doctrine of agricultural equilibrium, or if, whilst his doctrines developed themselves, agricultural instructions had fallen into the hands of men of science, instead of tradesmen.

It is true that in the schools of agriculture they had taken care to teach natural philosophy, chemistry, and other branches of natural history; but the knowledge that the pupils acquired in these sciences was not applied by the professor, completely ignorant of the sciences of practical culture, and skilful only in taking the land. Young men thought then that natural sciences only served as ornaments to trade, and that they were introduced into their studies merely to torment them.

In Germany the directors of these schools had succeeded in keeping them in the country, in some cloistered isolation, far from the scientific movement, which had then penetrated into all classes of the population, for in that way alone it was possible for them to ensure a certain duration to their system of instruction, and to their position.

In countries where, as in England and France, the *dite* of the better portion of the agricultural population were not poisoned by erroneous teaching, the development of the new doctrine followed its natural course. The principles in themselves were recognised as unimpeachable; only upon the manner of applying them, and how far their application might be extended, there were discussions which lasted several years. It was for the cultivators of England and France the time of study, in which they learned to know principles, and apply them judiciously.

On the contrary, in the eyes of teachers and holders of the general system of culture followed in Germany, the new doctrine seemed to be unjust pretensions. Destitute of all knowledge of the natural sciences, they could not comprehend the connexion which existed between the innumerable analyses of soils, plants, and manure, and the sciences themselves; they did not see that the new theory was only an expression of the facts themselves. They had been accustomed to designate by the word *theory* what they had by chance observed, and had had been explained to them of the phenomena of culture, and they knew that the theory one man formed was of no use to another; it was further admitted in principle,

that the practitioner ought not to be guided by these theories, but should conform himself to the circumstances in which he is placed, and to the evidences by which he is surrounded. They were not aware that these circumstances and evidences are natural laws, for they could not comprehend what science had to do with practice, and that its object was to throw light upon the facts and evidence which served for its rules.

Not only did the new doctrines appear to the school of agriculture in Germany as without foundation, but they considered it as a personal attack and an offence, because if the new doctrines were true, the old ones must be contrary to all reason, and those who taught them, far from promoting progress, prepared the future ruin of agriculture.

If, in fact, all operations of the cultivators are subject to imperious new laws, it was absurd of him to think that he possessed the least power over his land, or that his labor, experience, and ability had the power of obtaining a good crop from a plant that did not suit the composition of the soil which ought to produce it. It was not he, but the land that should choose the plant suited to it. He only put the plants into the ground, and his penetration consisted in interpreting what it told him. What depended upon will, and what constituted his art, reduced itself to finding out what was wanting in the land, in supplying it, and in removing the obstacles which hindered his fields from paying for the care that he bestowed on them.

All that certainly was in the new doctrines, and more than that; for in the transition to scientific practice, agriculture lost its ancient character. It could no longer be the innocent pastime of the country gentleman. The German cultivator had long misunderstood the source of the strength, well-being, and riches that flowed from it.

The idea of making artificially in all its constituent parts stable dung, for which a living organisation was necessary, appeared at first to cultivators an idea quite impossible to realize, and the first artificial manure caused a laughter amongst the farmers; and when the first trial of it failed, there was quite a jubilee amongst the learned agriculturists; the farmers rejoiced to see that the means destined to diminish their labors, and aid them in future, were not successful.

It would be unjust to suppose that the false and erroneous opinions of cultivators, now and formerly, are peculiar to their profession; or that men of any other profession whatever had come into the world, abler or wiser. The history of natural sciences shows how little this is the case. At the time of Thaer, analytical chemistry was little known: the constituent parts of the ashes of plants, the alkalis, phosphoric acid, &c., had not been discovered in land, so that naturalists then believed them to